In Support of Decision Making

**A Monograph
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Abstract

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This monograph investigates the art and science of problem solving and decision making in the operational planning environment.

The Army's current problem solving and decision making doctrine found in FM 5-0 (101-5) Army Planning and Orders Production (Final Draft) provides one simplistic process and lacks information in the art of problem solving for planners and decision makers to follow.

This research investigates the theory of problem solving and compares proven problem solving processes used and accepted in the business community with the Army's problem solving and decision making process. The research identifies components common to the processes analyzed, establishing goals or "end state" objectives, gathering information, and assessing implementation, which generally present challenges to the planner, and suggests methods to facilitate definition and communicate findings.

The problem solving and military decision making process contained in the Army's doctrine serves as a sufficient beginning point for planning at the tactical level; however, due to rigidity and a lack of examples in problem solving theory, it is not sufficient when dealing with operational level problems. The Army's process contains significant shortcomings for planners at the operational level because it does not address the theory of problem solving and lacks sufficient background of key components of the process - goal setting, information gathering, and implementation assessment.

This research concludes with recommendations to improve the Army's doctrine. It suggests the Army modify its existing problem solving and decision making doctrine to address additional relevant processes that are effective in a time constrained environment and when dealing with complex problems. Drawing the theory of problem solving together with existing processes enables the planner to recognize the many dynamics of problem solving anddecision making.

CHAPTER ONE

INTRODUCTION

<u>In Support of Decision Making</u> is a monograph that addresses the question: Does the current problem solving and decision making model outlined in Chapter 2 of the Final Draft of Field Manual FM 5-0 (101-5), *Army Planning and Orders Production* meet the demands and requirements of the operational level planner and decision maker?

The purpose of Chapter 2, Field Manual 5.0 is to provide "a common understanding of the fundamentals of planning and … the foundation for developing planning tactics, techniques,

and procedures."[1] The military decision making process outlined in FM 5.0, Chapter 3, serves as a good baseline planning tool for tactical level decision making and problem solving, but is not sufficient when dealing with the complex problems typically found at the operational level. This FM provides one model for leaders and staffs to follow in planning tactical missions. Joint doctrine fails to provide a process for problem solving and decision-making.

The operational planner faces many challenges. The continuity "files" provided by predecessors and the planners own mental models may no longer apply to the situations found in today's world. Political leaders require the military to do more, faster and more efficiently and with fewer resources. The operational planner must develop a strong skill set, techniques, and methods with which to apply the art and science of problem solving and decision-making.

Operational planners typically work on the edge of chaos. They rarely receive sufficient guidance and are frequently presented complex problems with little forewarning or understanding of the problem's background.[2] This chaos, when approached correctly, may in fact represent opportunity for the planner and decision maker. Their combined experiences will determine their abilities to understand and define the nature of the problem's environment. Their task is to balance chaos and order.

Operational problem solving and decision making requires an application of both art and science. The art is the theory, and the science is the process. The planner faces many challenges in performing this task. One is an understanding of the concepts behind the theory and another is the ability to select the correct process for the environment encountered.

This monograph analyzes a problem solving theory and three processes and components of the processes that facilitate effective decision making. The problem solving theory establishes a basis for understanding the processes that follow. Each process analyzed is distinguishable

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[1] Headquarters, Department of the Army, *Army Planning and Orders Production, (Final Draft)*(*FM 5-0 (101-5),* (Washington, D.C.: GPO, 15 July 2002), iii

from the others, rapid, systematic, and cyclic, and each stands on its own merit. Each has proven

effective in the field, and offers a different approach to problem solving for the planner and

decision maker. The monograph then analyzes key components of the process to assist the

planner in understanding the framework and relevant issues encountered in support of effective

problem solving and decision-making.

Common characteristics of problem solving models involve goal setting, or end state

(ends) identification, information gathering (ways), course of action development (means) and

analysis, and assessment. There exists a great amount of written work on course of action

development and analysis, so this research focuses on goal setting (end state identification),

information gathering, and assessment of decision implementation.[3]

The importance of correctly determining and clearly defining the desired end state or

goal for the problem cannot be overstated. The end state serves as the basis for all course of

action development. If incorrect, the wrong end state will usually result in solving the wrong

problem or merely a symptom of the problem.

In shaping the problem for better understanding and decision-making, the planner must

lay out the problem in terms of information affecting the problem, timing the decision, and assets

necessary to accomplish the purpose of the mission. The ability to communicate information

gathered is critically important to the planner's success; that is, the ability to analyze and

synthesize information in order to develop a viable, supportable, and acceptable course of action.

The planner does this by drawing information from available sources, assessing and categorizing

the information to facilitate a common operational picture between the planner and decision

maker. The planner's understanding of the relationships of the supporting background

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[2] LTC (P) Alan M. Mosher, USA, LTC (P) Brian F. Waters, USA, and LTC (P) Robert C. Johnson, USA, *Assumption Based Campaign Planning* (Advanced Military Studies Program Monograph, Command and General Staff College, 2002), Abstract

[3] See Headquarters, Department of the Army, *Army Planning and Orders Production, (Final Draft)* (*FM 5-0 (101-5),* Washington, D.C.: GPO, 15 July 2002), 3-23 to 3-47, for detailed information on military course of action development, analysis, war-gaming, and briefings.

information allows for predictive analysis and model building tools that assists the planner to identify significant points necessary for the decision maker to make an accurate decision.

The planner's role does not end with the decision. Many decisions suffer from a lack of attention or follow through, which typically result in an inability to achieve the desired end state. In designing a problem-solving plan, the effective planner will develop measures of effectiveness used to assess the progress of the decision's implementation. These measures are factors, sometimes critically, but always directly, affecting the problem environment and they directly influence the organization's ability to achieve the desired end state. Without a plan of assessment, the decision maker will not know that the decision made is not the correct decision until it is too late. A factor not achieved should generate a change to the course of action or another assessment of the problem environment.

This monograph summarizes with conclusions and recommendations of suggested changes to *FM 5-0 (101-5), Army Planning and Orders Production,* that support staff officers and leaders in recommending and making effective decisions. The conclusions will address the differences between the Army's problem solving and decision-making doctrine and the theory and various processes presented and recommend changes to the current doctrine. These changes will enable planners and decision makers to make better and more effective decisions.

CHAPTER TWO
LITERATURE REVIEW

The research orients on learning methods and models found most applicable to developing an understanding of the problem solving and decision-making processes most commonly used by military leaders. The models range the full spectrum of problem solving processes, from systematic, to cyclic to interactive

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The Art and Science of Decision-Making

Klein's *Sources of Power* (1998) suggests a rapid decision making process called the "recognition-primed decision-making (RPD) model." In the many examples of decision-making presented, the individuals surveyed produced effective results but they could not readily explain the thought processes used in making their decisions. Klein found that effect RDP decision-makers possessed great experience in problem environments.

The RPD model calls on experience to allow the decision-maker to visualize a situation as a prototype and quickly determine a suitable course of action. This model "fuses two processes: the way decision makers size up the situations to recognize which course of action makes sense, and the way they evaluate that course of action by imagining it."[4]

The RPD theory exists with three variances and an integrated version. In the "simple match" variation, the decision maker reorganizes a situation from a previous experience. With recognition, the decision maker develops four by-products. These by-products include expectancies, important cues, feasible goals, and a typical action to follow. After developing the by-products, the decision maker implements a course of action.[5]

The "diagnose the situation" variation allows the decision maker to not immediately recognize the situation as typical. It allows the decision maker to diagnose the situation by gathering more information until satisfying recognition requirements. This variation also allows for a complication by the decision-maker misdiagnosing the situation, but not realizing it until violating an expectation. When this happens, the decision-maker seeks anomalies to clarify the violation. When clarified, the process begins again from point of situation recognition. If the

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[4] Gary Klein, *Sources of Power; How People Make Decisions* (Cambridge, Massachusetts, The MIT Press, 1998) p24
[5] Ibid. 24

decision maker is not able to clarify the situation, then the process starts from the beginning as the decision-maker seeks to gather more information about the situation.[6]

The "evaluate course of action" variation shows how a decision maker assesses more than one typical action for the best or most efficient solution to the problem experienced. When using this method, the decision maker mentally tests each perceived course of action chosen before making a decision.[7]

Klein's decision-making theory supports a rapid and efficient decision-making process widely used by military and business leaders to make and implement important decisions. It is oriented on one individual decision-maker working without the benefit of a staff and working within time constraints in a highly stressful environment. This theory is therefore very applicable to the armed forces decision-making environment.

The Army' doctrine provides a similar model in FM 6-0*Mission Command: Command and Control of Army Forces*, Appendix A. Titled the OODA (Observe, Orient, Decide, and Act) Cycle, this decision-making process over-simplifies a very complex process. Similar to the RPD process, the OODA Cycle relies heavily upon the experience and study of one person - the decision maker. This process is cyclic; it begins with the start of an operation and continues until the end of the operation. The concept is that the decision-maker serves to continuously collect information relative to the problem environment. Through this continuous collection of information, the decision-maker is able to react faster than an opponent.

The Army's problem solving and decision-making doctrine is in Chapter 2 of FM 5.0 (101-5) *Army Planning and Orders Production.* In this manual, the United States Army provides a starting point for problem solvers and decision makers to use in assessing problems. This model incorporates a complete and very basic "systematic approach to defining a problem, developing courses of action (COAs) to solve the problem, arriving at the best solution, and

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[6] Ibid. 26
[7] Ibid. 26

implementing it"[8] process. Groups involved in supporting a decision maker generally accept this

method when provided good initial guidance and a clear end-state or goal. This is a satisfactory

derivation of the problem solving process when the problem is refined to a point of a properly

formatted mission statement and higher commander's intent. This process works well when

applied at the tactical decision-making level of war and generally nests neatly with other models.

The negative side of this model is that it is time and labor intensive and does not allow for further

growth of the problem environment, and is very process oriented.

Dietrich Dörner in *The Logic of Failure* (1996) offers a problem solving process that is

applicable for problems that are more complex. This process, while also systematic in its

sequence of action, allows for further development of the problem environment throughout. Also

distinguishing this model from others is that it begins most appropriately with the formulation of

goals and then proceeds through information gathering. Dörner addresses each step in detail, and

ties together each step in his sequence of action. It appears that this process would be applicable

in the operational and strategic problem solving and decision making environments.

Russell Ackoff presents a problem solving and decision making theory. In his book *The

Art of Problem Solving* (1978), he theorizes that true problem solving is an art form that requires

creative individuals to solve problems. Ackoff places the burden for problem solving squarely on

the individual making the decision. Ackoff dedicates much of his book to explaining the

environment of effective problem solving. Ackoff identifies five components of a problem and

then proposes that the efficiency in which the decision maker solves the problem is dependent on

his creative ability to address the components of the problem.[9] Ackoff would view the Army's

process, as he would any methodical process, as very scientific, and as such, believes it would

limit creativity and the result would be found wanting.

Analyzing and Synthesizing Information

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[8] Headquarters, Department of the Army, *Army Planning and Orders Production, Final Draft* (FM 5-0
(101-5), (Washington, D.C.: GPO, 15 July 2002), 2-10

FM 5-0 (101-5), Army Planning and Orders Production, Final Draft assists the problem solver by categorizing information. The Army's information gathering step begins after problem definition and continues throughout the problem solving process.[10] This model provides a problem for the operational planner because it assumes that much of the information necessary to define the problem is readily available. Proper problem definition cannot begin without an accurate assessment of the related background information first. The Army frames information as facts and assumptions.[11] The planner's ability to properly categorize information is critical to the Army problem solving process. A third category, opinions, accounts for an individual's personal judgment, and, while not generally of great value, a professional opinion is worthy of consideration when problem solving.[12] The Army's problem solving doctrine does not allow for effective analysis and synthesis of the information.

Dietrich Dörner addresses goal setting in the problem-solving environment. Properly developed and formatted goals begin the process to effective decision-making. Goals vary by type, positive or negative, and levels of clarity, ranging from unclear to general and finally to specific.[13] Obviously, a clearly stated goal will help the planner work in the right direction to solve the problem.

In Miller and Dess' *Strategic Management* (1996), the SWOT (Strengths, Weaknesses, Opportunities, and Threats) model assists the planner in analyzing and synthesizing information. The SWOT model provides a suitable assessment tool for the operational level problem solver and decision maker. The SWOT model focuses the planner on the internal and external

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[9] Russell L. Ackoff, *The Art of Problem Solving,* (New York, John Wiley & Sons, Inc., 1978), 24
[10] Headquarters, Department of the Army, *Army Planning and Orders Production, Final Draft,* FM 5-0 (101-5)(Washington, D.C.: GPO, 15 July 2002), 2-5
[11] Ibid. 2-6
[12] Ibid. 2-6
[13] Dietrich Dörner, *The Logic of Failure: Why Things Go Wrong and What We Can Do to Make Them Righ*, (New York, New York, Metropolitan Books, 1989), 70

environments of the problem presented.[14] The planner's understanding of the problem environment directly affects his ability to successfully develop plans in support of problem resolution.[15]

The external environment assesses the opportunities and threats upon an organization. Comprising the external environment are the general and competitive environments.[16] Each focuses on defining the environment as it relates to the external factors influencing the organization's problem environment.

The internal analysis provides a means of identifying the organization's strengths and weaknesses. The internal environment's analysis consists of an assessment of the organization's critical success factors, its individual components (the Value Chain), and an assessment of its core processes and systems. Each provides a useful tool for use by planners to categorize information relevant to organizational problem solving.

With slight modifications, these assessments would provide the operational planner an exceptional resource for collecting information on the strengths and weaknesses of his organization.

Capping off every problem solving process is an assessment of the progress of the plans implementation. This concept is not new to decision making theories; in fact, the processes discussed above include this step, but it is rarely executed because decision makers tend to make a decision and immediately move on to the next problem.

As an assessment tool, the planner establishes a set of factors designed to measure the progress of implementation and assess progress for variations from the plan. The planner identifies variations from the desired plan, determines the required adjustments, and implements

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[14] Alex Miller and Gregory G. Dess, *Strategic Management, 2d Edition* (New York, McGraw-Hill Companies, Inc., 1996), 12

[15] Miller and Dess, 80, state that the "environmental scanning focuses on gathering intelligence, and scenario planning which is focused on organizing environmental information in a way to best support the strategy formulation process."

[16] Ibid. 58

the adjustments in order to achieve the desired end state.[17] These factors may ultimately serve as early warning signs to the decision maker and planner that something is not right. These factors should consist of both holistic and analytical assessment tools to provide a complete picture of the progress of the decision's implementation.

CHAPTER THREE

THE ART AND SCIENCE OF DECISION-MAKING

Problems and opportunities generate decision-making. Truly effective decision-making requires a blending of the scientific processes and the theory or art of problem solving. The effective planner thoroughly understands this blending and applies it when solving problems.

The Art

Effective problem solvers must be creative individuals. Imperative to successful problem solving is the creative capability of the decision-maker. The level of experience of the planner and decision-maker generally determines the amount of creativity brought into the process. Individuals who do not possess this characteristic with sufficient weight will not solve problems,

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[17] Headquarters, Department of the Army, , *Army Planning and Orders Production* (Final Draft) FM 5-0 (101-5), (Washington, D.C.: GPO, 15 July 2002), 2-10

but will solve symptoms of the true problem. Creativity, of course, is not the panacea to problem solving; good problem solvers, business managers, and military leaders must possess a balance of the attributes of competence, communicativeness, concern, and courage.[18] Ackoff identifies five components of the nature of problem solving.

1) The decision maker is the individual or group facing the problem.

2) The controllable variables are aspects of the problem controlled by the decision maker.

3) The uncontrolled variables are aspects of the problem not controlled by the decision-maker.

4) The constraints imposed upon the problem. Imposed by or upon the decision-maker, these control the value of the controlled and uncontrolled variables.

5) The possible outcomes are the result of a joint effort of the decision maker and the uncontrolled variables.[19] There must be at least two possible outcomes or the challenge of decision-making does not exist.

Understanding the nature of a problem is important to a decision maker synthesizing the whole aspect of the problem. Without this situational understanding, the decision-maker may misdiagnose the true problem and solve a symptom by failing to accurately address the variables and constraints.

In considering the nature of problem solving, Ackoff suggests that the level of problem solving success enjoyed depends on the ability of the problem solver/decision maker to address each of the following components of a problem:[20]

1) The objectives or the desired outcomes, goals, or end state (ends).

2) The controllable variables are the possible courses of action (means) available to the planner.

[18] Russell L Ackoff, *The Art of Problem Solving; Accompanied by Ackoff's Fables* (New York, Wiley-Interscience Publication, John Wiley & Sons, 1978), 9
[19] Ibid. 11-12
[20] Ibid. 17

3) The uncontrollable variables include the problem environment.

4) And the problem solvers understanding of the combined relationship and the combination of the previous three components.[21]

The objective is the desired outcome. Army leaders understand this as the "ends" of the "ends, ways, and means." Defining the outcome usually presents a problem in itself, as there are many influencing factors to identifying and defining this outcome to the problem.

In order to understand the ends or objectives of the problem, the decision maker must first understand his own objectives as well as those of others involved, and how those objectives relate to each other.[22] The clear identification of the end state or objectives is the cornerstone of problem solving.

Ackoff sorts problems into two categories. There are those problems that are negatively oriented and those that are positively oriented. The aspect in which one views the problem is relative to the individual dealing with the problem. Understanding this point is critical to the ability to relate to objectives of others involved. The difference between positive and negative objectives "is not logical but psychological."[23]

When working in a group problem solving environment there will typically be conflict between members in deciding on an objective end state to the problem. In the Army, planners and leaders do not often appreciate this aspect of problem solving, because the leader should provide the desired end state from which the staff then works. However, in the leader's assessment of the problem, frequently there exists conflict from within, possibly as values and morals conflict with instructions received from a superior.

When conflict arises between the objectives of problem solvers, the effect of one is to reduce the value of the second. If the effect on the first is to increase the value or importance of the outcome on the second, then the first cooperates with the second. The parties are independent

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[21] Ibid. 17
[22] Ibid. 11-12

if the behavior has no effect on the objective outcome. The relationship between the first and the second party need not be symmetrical. The superior/subordinate relationship found in the military serves as a good case for this point. When conflict is not symmetrical the one that benefits or suffers the least, exploits the other.[24]

There are three ways to deal with conflict in problem solving: solution, resolution, and dissolution. Solving a conflict means to accept the conditions that generated the conflict and to seek a way of achieving the desired objectives regardless of the cost.

This means to win the conflict. A party wins in one of two ways - fighting or through "gamesmanship."[25] In fighting, one or both opponent's uses force to seek to overcome the other. Fighting continues until one party defeats the other, or a third, usually stronger party, intercedes. "Gamesmanship" describes the effort to win without fighting.[26] When parties attempt to resolve a conflict they accept the conditions that create the conflict and attempt to compromise. Each usually gives up something desired and gains something it may not have otherwise obtained. The parties agree and resolve their differences when each feels that the distribution of gains is fair or appropriate.[27] There is no conflict when the conditions, which were the source of conflict, disappear. Leaders dissolve conflict by changing the environment or the opponents that were the source of conflict.[28]

The typical sources of conflict are a scarcity of resources, an invasion or overwhelming of the senses (such as mentioned above in the military leader example of internal conflict), or from a third party. The greatest source of conflict usually arises from a scarcity of resources.

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[23] Ibid. 20
[24] Ibid. 39
[25] Ibid. 40
[26] Ibid. 40
[27] Ibid. 40
[28] Ibid. 40

Sometimes the easiest way to remove conflict is to remove the scarcity of the resource. In an invasion of the senses, the easiest way may be to divide the environment.[29]

Once we understand the objectives of the problem presented, the planning team identifies the controllable variables. The controllable variables are the means, or COA, for solving the problem.

True creativity in problem solving is in the way decision makers and planners deal with the controllable variables of the problem; in other words, how creative they are in developing courses of action. Controllable variables are either relevant or irrelevant.

Obviously, planners must identify and discard the irrelevant controllable variables so that they do not distract from the problem solving process.

Frequently, there are more relevant controllable variables than normally considered. These, until considered controllable, are categorized as uncontrollable variables. These previously uncontrolled variables, when properly considered, can often lead to creative and effective solutions to problems.[30] Considering this as fact, it is important to understand how decision makers and planners can draw these uncontrolled variables to the front.

Enlarging the method of study can positively influence the development of creative means. The tendency in problem solving is to reduce the problem environment into something perceived as more manageable or simple in scope. In doing so, individuals typically work on the area of the problem in which they are most comfortable. This serves to answer a need to work within one's comfort zone.[31] Working within one's comfort zone is not necessarily good when problem solving, as it leads to complacency and a lack of creativity.

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[29] Ibid. 40
[30] Ibid. 50
[31] Ibid. 53, Ackoff suggests that "the greater the variety of backgrounds of the people who examine a problematic situation, the greater the variety of variables that will be considered as susceptible to control."

The problem's uncontrolled variables affect the outcome of the course of action selected. "Uncontrolled variables often both create the problem confronted and constrain the actions that the decision maker can take to solve it."[32] Problem solving must work within the conditions and constraints, imposed by the uncontrolled variables. When working with uncontrolled variables and constraints the planner determines the value of the variable as it relates to the problem. "In fact, the very existence of a problem, let alone its properties, depends on these values."[33] Military problem solvers refer to the uncontrolled variables as the facts of the problem. A fact is "an observed and reported event, past or present."[34] While Ackoff does not distinguish between them, assumptions accompany facts as an important component of the uncontrollable variable. An assumption is information accepted as fact without evidence.[35] When proven false, that information previously considered a fact or assumption, if relevant, would likely now present a controllable variable and opens another potential course of action to the planner. The degree to which he identifies relevant controllable variables from previously conceived uncontrollable variables would determine his creative ability in solving the problem.

The effectiveness with which the planner and decision maker solve the problem is dependent on the ability to understand the relationship of the controlled and uncontrolled variables to the objective. How decision-makers manipulate the variables determines their understanding of the perceived relationship. "Causality is the most important relationship involved in problem solving."[36]

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[32] Ibid. 100

[33] Russell L Ackoff, *The Art of Problem Solving; Accompanied by Ackoff's Fables* (New York, Wiley-Interscience Publication, John Wiley & Sons, 1978), 79

[34] Headquarters, Department of the Army, FM 5-0, *Army Planning and Orders Production (Final Draft)*, (Washington, D.C.:GPO, 15 July 2002), 2-6

[35] Ibid. 2-6

[36] See Ackoff, *The Art of Problem Solving; Accompanied by Ackoff's Fables*, 101, Ackoff states that "Many of our problems solving failures derive from assuming a casual connection where one does not exist or incorrectly characterizing a casual connection where it does not exist. Perhaps the most common single cause of failure in problem solving derives from incorrectly assuming a causal relationship between variables that have only been demonstrated to be associated."

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Causality is important because in problem solving decision-makers seek to bring about a change to an objective or end state.[37] Variable association tends to be the most confusing part of effective problem solving, because it tends to be time and resource intensive and very taxing to the problem solvers abilities. Associated variables are those that tend to change simultaneously, in the same or opposite directions. Associations that move in the same direction are positive; those that move in opposite directions are negative. Variables that appear to have no relationship are not causal, under the conditions observed. However, observed under different conditions, casualty may exist between these same variables. The problem solver seeks to alter one or more aspects of a situation in order to bring about a change.[38]

Change will only occur when the relationship between the aspect manipulated and the aspect changed is casually related. Complex problems rarely have one simple causal viable solution.[39]

In establishing goals, the decision maker's ability to overcome conflicts internal or external is significant in eliminating confusion or indecisiveness in implementation the course of action. There exists a necessary balance between the demands of one side of conflict with the other. Yet it remains important when resolving conflict not to lose focus of the original problem, or the decision maker and planner's endeavors will solve a symptom of the problem and not the true problem. Finally, the decision maker should not lose focus of the possible consequences of the outcomes.

To increase the number of controllable variables considered the planner must overcome concept of relevancy.[40] When properly considered, many uncontrollable variables become

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[37]Russell L Ackoff, *The Art of Problem Solving; Accompanied by Ackoff's Fables* (New York, Wiley-Interscience Publication, John Wiley & Sons, 1978), 101
[38] Ibid. 118
[39] Ibid. 118
[40]Ackoff, *The Art of Problem Solving; Accompanied by Ackoff's Fables,* 79, Ackoff states that "we" "come to a problem with a concept of relevancy that dictates what variables we consider"

controllable. The planner determines relevancy status from education and previous experience dealing with comparable situations.[41]

Many techniques exist to facilitate the creative problem solving process. The military planners routinely use the brainstorming technique to identify the controllable and uncontrollable variables. Brainstorming is an effective technique, if done properly, when operating in a group environment.

A few important aspects of uncontrollable variables to keep in mind are that another person may control those not controlled. In addition, many constraints are self-imposed, creating for the planner a perceived uncontrolled variable when, in fact, it is controllable. Frequently, additional research of the facts and assumptions of the given problem may bring the uncontrolled variable under control.[42] When this occurs, there undoubtedly exists a new controllable variable, or another possible way of solving the problem.

The Science

The most effective process used to make the decision will always be situationally dependent on time, experience, and resources available. As opportunities presented are the result of a change in a situation or condition, this research will focus on decision-making done in support of problem solving. Some of these decisions are the result of a well thought-out process attributed to many individuals working collectively in support of the decision maker. "People spend little time thinking about how to make a decision."[43] This statement attributes the incorrect process with causing decision-making failures. Most attempts at decision-making, however, are the result of years of experience of trial and error. Selecting the proper process may prove a problem in itself. Fortunately, our academic and business community has already addressed this issue and provides many suitable models to follow.

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[41] Ibid.50
[42] Ibid. 100, Ackoff suggests, "Part of the art of problem solving lies in knowing when and how to use such research."

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Army leaders make decisions to solve a problem or take advantage of an opportunity. The Army's doctrine correctly identifies three types of problems. Yet, other than identifying the characteristics of each type of problem, it does not go into the details of how a planner could attack each, or even if the different types of problems require different processes.

1) The well-structured problem

2) The medium-structured problem

3) The ill-structured problem[44]

Experience and history have shown that most operational level problems range from medium to ill-defined types of problems.[45]

The Army's doctrine provides a seven-step problem solving and decision-making process. This method of addressing the range of all types of problems is simplistic in concept yet difficult in execution.[46]

1) Problem Definition – Determine the scope, limitations, and the root cause of the problem. Also, consider the desired end state. Finally prepare a problem statement. With ill-defined problems, it will be necessary to gather information before developing a problem statement.

2) Information Gathering – Learn facts and assumptions associated with the problem. Planners must manage this information in order to ensure the relevant information is accurate.

3) COA (Course of Action) Development – follows information gathering. This step

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[43] Paul C. Nutt, *Why Decisions Fail: Avoiding the Blunders and Traps that Lead to Debacles*, (San Francisco, Berrett-Koehler Publishers, Inc., 2002), 4

[44] Headquarters, Department of the Army, , *Army Planning and Orders Production* (Final Draft), (FM 5-0 (101-5) (Washington, D.C.: GPO, 15 July 2002), 2-3

[45] Interview with LTC Jarkowsky

[46] HQ, Department of the Army, FM 5-0, *Army Planning and Orders Production* (Final Draft), (Washington, D.C.: GPO, 15 July 2002), 2-4

develops various (at least two) plans to solve the problem. The planner develops a set of criteria, and the decision maker determines which best suits problem resolution. The criteria are feasible given the constraints provided, and acceptable in the framework of risk or cost associated.

4) COA Analysis – A systematic approach to comparing alternatives. With the application of an appropriate evaluation criterion, the planner compares the COAs against each another.

5) COA Comparison –The planner lists advantages and disadvantages to each COA and presents the results to the decision maker for a decision or modification.

6) Decision – The decision-maker selects a COA or modifies those presented. Alternatively, calling on experience, the decision-maker may elect to implement a completely different COA.

7) Execution and Assessment – In making the decision, a plan for implementation of the decision is also developed. The decision–maker monitors the execution to ensure meeting of the established success criteria, as well as the desired end-state.

The significant issues with this process lie in its rigidity, and the time and resources needed to execute the process correctly. With a single exception of the first two steps, the completion of the previous step is necessary before beginning the next. While simplistic in plan, this process requires a staff of well-trained support personnel. This is an evolutionary process, as the planner completes each step in the process before beginning the next. After completing step two, it is not possible to work ahead without compromising the results of the process and possibly the resolution of the problem.

This absorbs an inordinate amount of time and effort of the decision maker's support system. This model works best with well-defined and medium structured problems. Through design, it best supports a process that begins with a clearly defined set of objectives or end-state,

which is something an operational planner will likely not find readily available. The
objective/end state for an operational leader and planner is a task and purpose mission statement.

At the operational level, problem solving begins with first gathering information to
identify the correct end-state. The process then progresses to define the problem. The decision
maker determines the end-state, and translates the data surrounding the problem into usable
information. He can only then develop a suitable, feasible, and acceptable course of action.
Accompanying the recommended decision, and all too often overlooked in the process, is a
method of ensuring the correct progress of execution.

The Army has another decision-making model used exclusively by the decision-maker.
While this research focuses on the FM 5-0, Army Planning and Orders Production (Final Draft)
Problem Solving and Decision Making model addressed above, the second model warrants
discussion here as it serves as an example of a rapid decision making process widely adopted by
military leaders.

The Observe, Orient, Decide, Act (OODA) Cycle found in FM 6.0 Mission Command:
Command and Control of Army Forces (Approved Final Draft), October 2002 adequately
addresses the rapid decision making process that leaders exercise when operating with time
restrictions. Army leaders use this process to command and control Army land forces in a time-
restrained condition.

This model (Figure 1)[47] formalizes a rapid decision-making process that is continuous
and leader/commander centric[48].

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[47] Headquarters, Department of the Army, *Mission Command: Command and Control of Army Forces
(Approved Final* Draft), FM 6.0, (Washington, D.C.: GPO, October 2002), A-1
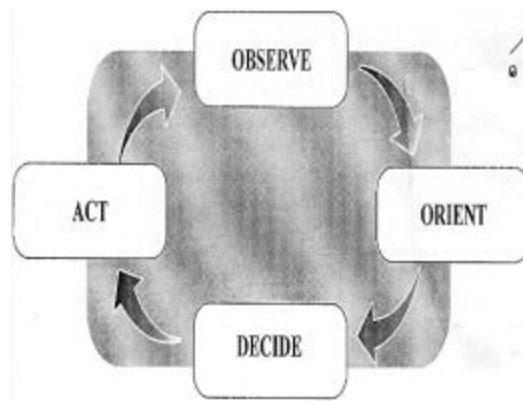[48] Ibid. A-1

Figure 1

Information gathering initiates this process: The leader *observes* the environment

seeking to achieve situational understanding and a visualization of the environment.[49] He then

orients on this understanding, mentally weighing COAs in an effort to decide what action to take.

After making the decision, he *acts*, by communicating instructions.

This decision making theory is important because it facilitates a speedy decision making

process to remain ahead of an adversary. This process weighs heavily on experience in

execution. It simplifies "an extremely complicated process."[50]

Also important to this process is the decision maker's previous understanding of the

environment in which he is operating. This process will likely fail if the leader does not possess

both a vast amount of experience and a solid basis of appreciation for the environment. Because

it relies heavily on experience to recognize a similar situation, this process would not work well

in an ill-defined problem situation.

This process does not allow for measures of effectiveness or provide tools with which to

judge progress. As a result, the process continues until the situation is resolved.

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[49] Ibid. A-2

[50] Headquarters, Department of the Army, *Mission Command: Command and Control of Army Forces (Approved Final* Draft), FM 6.0, (Washington, D.C.: GPO, October 2002), A-1

Unfortunately, this process becomes less effective with a decline in the experience of the decision maker. It is not efficient in there exists a great potential for the decision maker to solve a symptom of the problem rather than the true problem. The Army tactical leadership uses these models every day. Arguably, these models demonstrate their abilities to serve the military service well. The Army's decision-making models, while sufficient in a broad perspective, do not provide enough for operational level leaders and staffs (planners frame problems for the leader) to deal with the complexity of operational level, ill-defined problems.

Our business community routinely deals in complex operational level problem solving and decision making in the pursuit of positioning products in markets to support its positive flow of income. In other than a war condition situation, one may argue that the business leaders have more incentive to ensure their decisions are right the first time. This is because business leaders are obligated to their shareholders and themselves to produce results in the most efficient manner possible, and if they fail, businesses may fail.

The decision-making processes used vary greatly depending on the requirements of the decision. Army planners and decision-makers must understand these other problem solving and decision making theories in order to make decisions that are more informed.

Significant distinguishers of the different processes used include time, information available and experience. To make the correct decision, the leader must correctly consider the time and resources available and the level of accountability appropriate to the decision made. These models may serve the operational level leadership in making better decisions.

The recognition-primed decision (RPD) theory of decision-making developed by Gary Klein, *Sources of Power; How People Make Decisions* (1999), offers a time efficient decision making process, widely accepted, and frequently used by business leaders.[51] While similar to the OODA Cycle, this model contains much more information on the requirements of

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[51] Gary Klein, *Sources of Power; How People Make Decisions,* (Cambridge, Massachusetts, The MIT Press, 1999), 26

the process. A further distinguishing feature is the establishment of beginning and ending points. The RPD process starts with a distinct beginning and completes with a distinct ending, while the OODA cycle is almost a continuous process.

In this process, the decision maker recognizes a situation from previous experiences, and implements a course of action to achieve a goal. The decision-maker calls heavily on imagination to visualize the solution. The result is not necessarily always the best (most efficient) solution, but usually is appropriate to resolving the problem presented. The purest form of this method relies on one highly skilled individual and does not allow for information from sources other than the data collected by the decision maker.

Characteristically, leaders use this model when the decision maker has very little time, few external resources, and great experience operating in the problem environment.[52] A weakness of this method is that it relies heavily on experience, and it follows that the decision maker is not operating in a highly stressful or personally threatening environment. In addition, if the decision maker is not experienced with the situation presented he may make an incorrect decision by misinterpreting the information observed.

It is important here to recognize that when using this model, the decision maker, upon identifying a problem, immediately determines the desired end state. Then, calling on experience, discounts other courses of action as not suitable, feasible, or acceptable, and executes a course of action suited to resolving the problem[53].

This process identifies that decision makers will utilize one of two methods in determining the best of possible courses of action. The comparative evaluation approach and the singular evaluation approach methods both support the RPD theory. In the comparative evaluation approach, the decision maker considers two or more possible courses of action, simultaneously considering their relative advantages. In the singular evaluation approach, the

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[52] Ibid. 24
[53] Ibid. 17

decision-maker evaluates each course of action on its own merit. In the singular approach, the decision-maker selects the first course of action that works. The result of this method was usually time efficiency, not necessarily cost, or benefit efficiency.[54]

The level of experience permitted the decision-maker to identify a feasible and sound course of action on the first attempt, so that it was not necessary to consider other courses of action. The decision-maker's mental attributes of intuition and mental simulation support the RPD model theory. Intuition is useful because it supports the rapid assessment of a situation through "the use of experience to recognize key patterns that indicate the dynamics of the situation." [55] This mental simulation supports COA development, relying on the decision-makers "ability to imagine people and objects consciously and to transform those people and objects through several transitions, finally picturing them in a different way than they start."[56]

Understanding the mental simulation component of this theory is significant for the military decision-maker because it is through this process that the decision-maker develops an understanding of a flow or sequence of actions. The proper understanding of this sequence is necessary to resolve problems that are more complex. At the operational level of war, one can see this sequence of actions as lines of operation.

The integrated version (Figure 2) of the recognition-primed decision model combines the aspects of each version to explain the RPD process.[57]

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[54] Ibid. 20
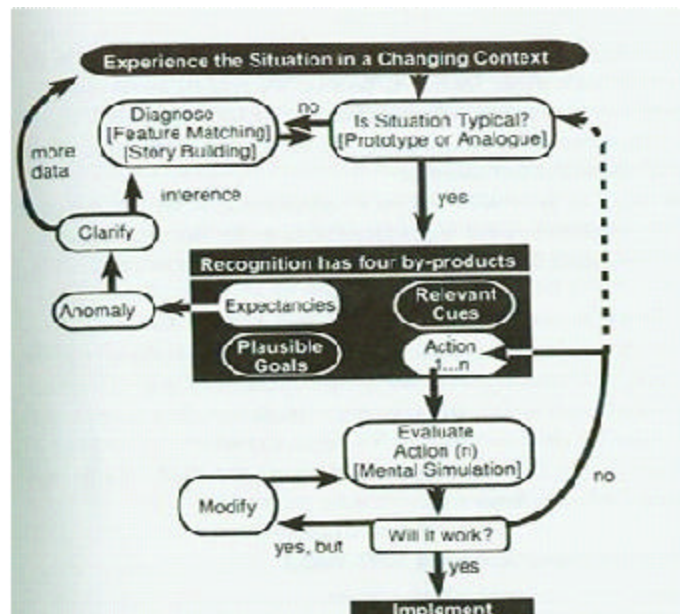[55] Ibid. 37
[56] Ibid. 45
[57] Ibid. 27

Figure 2

Klein developed three variations of the RPD model (see Appendix 1). Each approaches different elements of the decision making process from various angles.

1) Simple Match (variation one), is similar to the Army's current OODA model. Here the decision maker recognizes the problem from experiences then determines that the environment is typical to the experience. This serves as the basis for recognition. Recognition consists of four by-products, expectancy, relevant cues, plausible goals, and typical action. Once meeting each of these conditions, the decision maker implements the course of action.[58]

2) Diagnose the Situation (variation two); the decision maker finds it necessary to commit more attention to determining the problem, because the environment may not clearly match a typical case. If the decision maker determines that the situation is not typical, he attempts to diagnose the problem. The process then continues as with the Simple Match variation. This variation also allows for an inconsistency in the recognition by-product of expectancy. This is reasonable given that this variation begins with the decision maker

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[58] Ibid. 25

identifying that the problem is not typical to his experience. The decision maker determines that an anomaly exists when not meeting or exceeding the expectancy. He then seeks to gather more information in order to clarify the situation or through matching the observed data to multiple previous experiences or by creating a theory "story building" in order to answer the perceived anomaly.[59]

  3) Evaluate Course of Action (variation three), includes an evaluation of the action as an additional step to the model. In this model, the recognition by-product of action is not determined with identification of the problem. Here the decision maker evaluates various COAs attempting to identify failure points in the considered sequence of action. When he identifies a failure point, he discounts the COA and reviews another. Klein found that some decision makers would go with the first acceptable COA while others compared and contrasted several acceptable COAs for the best possible result.[60]

  With each variation, Klein found that a higher level of experience allowed the decision-maker to better identify a feasible and sound course of action. Mental simulation supports COA development, relying on the decision-maker's "ability to imagine people and objects consciously and to transform those people and objects through several transitions, finally picturing them in a different way than they start."[61] Understanding the mental simulation component of this theory is significant for the military decision-maker because it is through this process that the decision-maker develops an understanding a flow of or sequence of actions. The proper understanding of this sequence is necessary to resolve problems that are more complex.

  Klein learned decision makers frequently and widely accept this method,[62] as it is time efficient, supporting an abbreviated decision-making time cycle. This method is useful in situations where only one person is involved in making the decision. The key to successful RPD
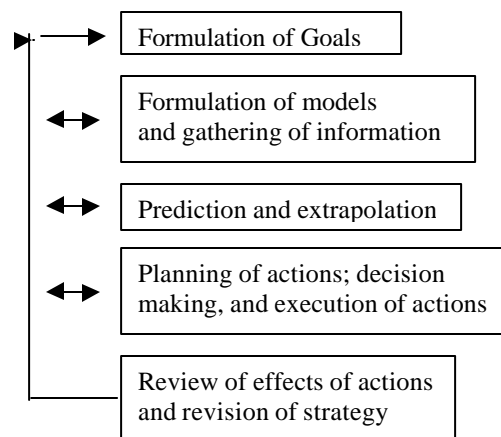
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[59] Ibid. 26
[60] Ibid. 26
[61] Ibid. 45

decision-making is experience. Characteristically, it is used when the decision maker has very

little time and great experience.[63] A weakness of this method is that it relies heavily on

experience. If the decision maker does not possess the necessary experience to identify the true

problem, an incorrect decision could have catastrophic results.

Complex operational problems frequently demand more analysis and synthesis than that

offered by the RPD model or the Army's seven-step problem solving and decision-making

process.

Dietrich Dörner developed a five-step process (Figure 3) of organization for dealing with

complex problems.

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┌──────────────────────────────┐
│   Formulation of Goals       │
└──────────────────────────────┘

┌──────────────────────────────┐
│   Formulation of models      │
│   and gathering of information│
└──────────────────────────────┘

┌──────────────────────────────┐
│   Prediction and extrapolation│
└──────────────────────────────┘

┌──────────────────────────────┐
│   Planning of actions; decision│
│   making, and execution of actions│
└──────────────────────────────┘

┌──────────────────────────────┐
│   Review of effects of actions│
│   and revision of strategy    │
└──────────────────────────────┘
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[62] Ibid. 28
[63] Ibid. 17

Figure 3

While on the surface it appears very similar to the Army's seven-Step process, this model differs because conceptually it is an interrelated process, and allows for developing details throughout the execution of the entire process. This means that in the execution of each step, if the planner identifies a variable not previously considered, the process begins again from the most applicable point; also this process recognizes that with the completion of one goal another problem will emerge.

Defining goals is the first step in this process. Dörner's position is that defining goals is the first step in dealing with complex problems, and he cautions against using ill-defined goals.[64] Clear goals provide the planner with a measure of assessment to determine the appropriateness of COAs available.

The second step combines model formulation and information gathering. The information collected should present a picture for the planner and decision maker. Correct categorization, determining relevancy to the problem and goal, and understanding the interrelationship between the various bits of information make if the challenges presented to the planner in gathering information.

In the third step, the planner assesses the gathered information and, through analysis of the current situation, attempts to predict the future problem environment. This will permit the planner to begin to develop a series of courses of action to deal with the problem.

Developing the courses of action, selecting the course of action, and supervising the execution of the decision is step four of this model. In this step, Dörner cautions against working within "pre-established patterns," and cautions the planner to "know when to follow established

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[64] Ibid. 43

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practice and when to strike out in a new direction."[65] In applying the art of problem solving

discussed earlier, the planner should avoid entrapment or stepping too far out of the planning box.

Assessing the actions and reviewing strategy as necessary complete this process.

Planners should prepare to modify their plan if the solution desired is not obtainable with the first

course of action. Here again the planner must apply a mixture of judgment and persistence, and

know when to give up and when to proceed.

Operational planners must understand and employ the best, most applicable process for

the problem environment encountered. Numerous factors make up the problem environment and

serve to create a problem of selection for the planner even before he begins. Some of these

influencers for determining the process are the time available, resources (models, people, and

tools) available, and the skills and experiences of the planner and decision maker. The process

used will determine how the decision maker stages the activities thought to be important to

decision-making.[66] Organizations with time available and strong professional and experienced

groups without a clear leader dealing with a complex problem environment will likely choose to

use Dörner's model. The Army's model is suitable for use by groups of less experienced

personnel with an obvious group leader, plenty of time, an uncomplicated problem environment,

and a clearly defined end state or goal. The RPD model and OODA cycle both support rapid

decision-making by one individual possessing experience in the problem environment.

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[65] Ibid. 45

[66] Paul C. Nutt, *Why Decisions Fail: Avoiding the Blunders and Traps that Lead to Debacles*, (San Francisco, Berrett-Koehler Publishers, Inc., 2002), 59

CHAPTER FOUR

GOALS, INFORMATION AND ASSESSMENT

From reviewing the various processes and Ackoff's theory, it is obvious that there is much more to problem solving and decision making than following a methodological fill-in-the blank, step-by-step process. Certainly, this method is also viable in some situations, but not in the operational planning environment; when dealing with problems that are more complex, the

process followed becomes more important. Most processes begin with identifying the goals or the desired end.

Formulating the End State

"In complex systems, few things are as important as setting useful goals."[67] The goals are not always obvious and tend to become less obvious with an increasing level of complexity. Simply stating a goal "often indicates that we don't know precisely what we want."[68] Clear goals provide guidelines and criteria for assessing the appropriateness or inappropriateness of measures taken to solve the problem.[69] In order to understand the formulating of goals, it is important to understand the diverse kinds of goals. The distinction between positive and negative goals lies with the decision maker. In simple terms, a goal is positive when designing it to achieve a condition. Conversely, the goal is negative if the decision maker does not desire a certain condition. Negative goals tend to infer avoidance of something, and generally are difficult to define; as such, planners should avoid negative goals.[70]

There are also general, specific, and unclear goals. A general goal tends to be ambiguous, that is only a very small number of criterion define it. Because it is ambiguous, planners will want to define it better, into a specific goal. Many criteria characterize the nature of specific goals. Goals that lack definitive criteria are unclear goals. Decision makers must recognize and avoid unclear goals as they lack clarity and usually indicate the presence of multiple goals. The numbers of criteria used facilitate defining of the goal.[71]

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[67] Dietrich Dörner, *The Logic of Failure: Why Things Go Wrong and What We Can Do to Make Them Right* (New York, New York, Metropolitan Books, 1989), 70
[68] Ibid. 44
[69] Ibid. 44
[70] Ibid. 50
[71] Ibid. 51

Multiple goals are those that require the planners to attend to many factors and criteria simultaneously when acting to resolve a problem. This is satisfactory when the variables are interrelated and the positive resolution of one acts positively upon the other. However, if tied negatively, then the opposite result will occur, and the positive action upon one will result in a negative action on the other. Multiple goals unfortunately are the norm at the operational level of military planning and it is important that the planner recognizes the existence of these multiple goals and their variables as well as understands their relationships.

Finally, there are implicit and explicit goals. Implicit goals are those that exist but not known until after first taking into account all aspects of a problem. Generally, in goal formulation there exist a number of implicit goals not considered when forming a plan to achieve the goal. Explicit goals tend to be those goals on which planners focus, and account for wasted time and effort. Since they overlook the implicit goals, and attempt to solve only those explicit goals, they create new problems.

Operational planners must understand the complexity of the system in which they are attempting to solve the problem. In formulating goals, planners should attempt to minimize as much as possible those distractions that cause confusion and duplication of effort. Often, making a negative goal into a positive goal helps clarify the objective, and when defining an unclear goal the planner learns of many more clear goals. Draw specific goals from general goals. General goals lead to ambiguous resolution and frequently the planner will not recognize the resolution of the problem. Multiple goals are almost unavoidable in the operational planning environment. However, if the planner understands the inter-relationship of the variables comprising the problem environment in which he is operating, he can frequently solve many problems.

In defining the goal or end state, the planner should avoid an over simplified definition of the goal. Over-simplifying of the goal definition serves to mask the true complexity of the problem, leading to obscurity and eventual loss of the true problem. Overly simplified goals

generally indicate an unclear goal and multifaceted problems, consisting of many interrelated variables.

Properly organizing for problem solving allows the planner to focus on one or a few problems simultaneously. A thorough study of the problems will reveal an understanding of their interdependencies. Through an analysis of the interdependencies, the planner can locate the central problem among a number of peripheral problems. In military planner lexicon, this is the center of gravity of the problem and this is where the planner should invest the majority of his efforts in solving the problems.[72] If the many problems are not distinguishable then the planner should attempt to organize them in order of importance and urgency. Solving the problem with the nearest suspense date may appear the most important. But without an appropriate appreciation of interdependence of common variables, solving the shortest suspense problem first may result in additional problems later.[73]

Delegation offers the planner another method of dealing with multiple problems simultaneously. This method only works when solving problems that are independent and not closely related; it is very effective when dealing with complex and quickly changing situations.

Proper goal setting is the most important part of the problem solving and decision making process. The planner's thorough understanding of the desired end state is essential to the ability to sort information, build courses of action, and make recommendations to the decision maker. Incorrect goal definition can often lead to treating a symptom of a problem rather than solving the true problem.

Information Gathering

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[72] Headquarters, Department of the Army. *Field Manual 3-0, Operations,* (Washington, D.C.: GPO, 14 June 2001 states that the "centers of gravity are those characteristics, capabilities, or localities from which a military force derives its freedom of action, physical strength, or will to fight. Destruction or neutralization of the enemy center of gravity is the most direct path to victory."
[73] Dietrich Dörner, *The Logic of Failure: Why Things Go Wrong and What We Can Do to Make Them Right* (New York, New York, Metropolitan Books, 1989), 56

A key responsibility of the planner is to develop an effective information system. An effective information system filters information, eliminating that which is irrelevant, and condensing that, which is relevant.[74] Effective data gathering techniques provide the planner with a method to categorize information, as well as provide a logical and methodical procedure for presenting the relevant information to the decision maker. Proper categorization facilitates analysis and later communication of the information to the decision maker. Critical to the effective analysis and eventual synthesis of the information is the planner's ability to understand the interrelationship of the many variables applicable to the problem. A key to understanding is categorizing the information into something that is both manageable and presentable.

The Army identifies two types of information applicable to the problem solving and decision making process. Facts and assumptions are variables and make up the body of information available to the planner in developing a course of action.[75] The proper assessment of a relevant fact or assumption is largely responsible for the quality of the course of action the planner develops.

A fact is a verifiable piece of information and forms the basis for the eventual solution. "A fact is an observed and reported event, past or present."[76] Relevant facts form the foundation for the next step, COA development.

An assumption is information that the planner recognizes as true, but for reasons outside of the planner's control, he cannot categorize as fact. Characteristics of valid assumptions are that they are likely to be true, and they are relevant or essential to the problem.[77] Effective planners do not wantonly use assumptions in the problem solving process. Planners must maintain an accurate record of each assumption considered relevant. If proven false, the

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[74] Russell L. Ackoff, *The Art of Problem Solving,* (New York, John Wiley & Sons, Inc., 1978), 203
[75] Headquarters, Department of the Army, *Field Manual 5-0, Army Planning and Orders Production (Final Draft),* (Washington, D.C.: GPO, 15 July 2002), 2-6
[76] Headquarters, Department of the Army, *Field Manual 5-0, Army Planning and Orders Production (Final Draft),* (Washington, D.C.: GPO, 15 July 2002), 2-6
[77] Ibid. 2-6

assumption will generate an unsupportable COA. As the COA will be unsupportable, the COA development process must begin again. Planners should discard those facts and assumptions not relevant, as they tend to confuse an already complex process and soil information relevant to the problem.

Also considered in the Army's process is a soldier's opinion, which may also influence the course of action development. An opinion is only relevant when the soldier expressing the opinion is experienced in the problem environment and possesses a great amountof good personal judgment.

Developed for business leaders the SWOT (Strengths, Weaknesses, Opportunities, and Threats) model provides a conceptual tool for gathering, sorting and categorizing information in the business environment. Successful business and military leaders understand through a correct analysis and synthesis of the environment that they must adjust their plans and strategy.

In the business community, the SWOT model assists in developing the business strategy by providing a strategic analysis of the environment.[78]
The SWOT analysis matches the environments of the organization's internal strengths and weaknesses, against the external opportunities and threats facing it.[79] This allows the business planner a ready tool to look both inside and outside the organization; slightly modified, it could serve as an effective tool for the military planner as well. The external environment consists of both general and competitive environments. Both consist of factors that may influence the development of developing COAs.

The external environment consists of the demographics, sociocultural, political/legal, technological, macroeconomic, and global.[80] These factors interrelate with one another, and frequently an impact on one positively or negatively affects another. Typically, the general

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[78] Alex Miller and Gregory G Dess. *Strategic Management,* Second Edition,(New York, The McGraw-Hill Companies, Inc. 1996), 38
[79] Alex Miller and Gregory G Dess. *Strategic Management,* Second Edition, (New York, The McGraw-Hill Companies, Inc. 1996), 39

environment will offer both opportunities and threats to development and growth of the

organization, and it defines the constraints in which an organization functions. Operational

planners should consider some opportunities as a way of building flexibility into their plans.[81]

The competitive environment consists of addressing those opportunities and threats from

within the organizations competitive arena.[82] The factors influencing this environment consist of

five competitive forces. These competitive forces, seen below in the Five-Forces Model of

Competition,[83] (Figure 4) allow an assessment of the business community's relationship to

competitors, customers, and suppliers.

The Five Forces Model of Competition

Threat of New Entrants

Bargaining Power of Suppliers

Rivalry Among Existing Firms

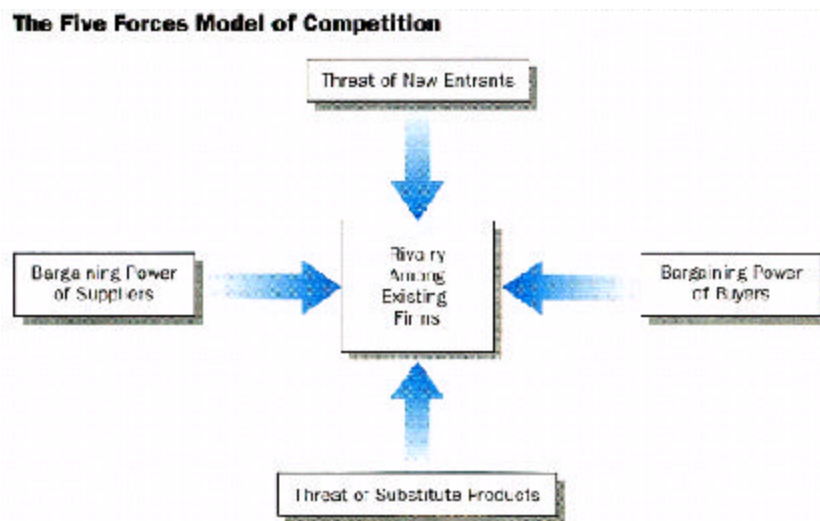Bargaining Power of Buyers

Threat of Substitute Products

Figure 4

This model provides an excellent tool to assist planners in understanding their

competitive environment. Again, the planner's understanding of the interrelationship of the

factors is significant to properly understand the environment.

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[80] Ibid. 59

[81] LTC (P) Jeffrey Jarkowsky, interviewed by author, telephone, 1 April 2003

[82] Alex Miller and Gregory G Dess. *Strategic Management,* Second Edition, (New York, The McGraw-Hill Companies, Inc. 1996), 64

[83] Ibid. 64, see pages 65-71 for more specific information on the Five Force model and the factors comprising each

An internal analysis of an organization's strengths and weaknesses allows the planner to identify and address relevant facts when developing a COA. As when addressing the external environment, without this assessment, the planner may not develop a suitable, feasible, or acceptable COA.

A consistent reason for failure is an overestimation of his organization's true capabilities. This happens when the planner fails to take into account the strengths and weaknesses of the subordinates.[84] The internal analysis provides an assessment of how well or efficiently the organization executes its role in either its industry or field. Conversely, the same holds true for the organization that underestimates its own abilities; it may miss opportunities present because it does not believe that it is capable of successfully accomplishing an objective.

The business community uses three frameworks to guide its assessment of its internal strengths and weaknesses. These factors are Critical Success Factors (CSF), the Value Chain, and core business processes.

The planner's understanding of the organization's CSFs is essential to the ability to develop viable COAs that allow the organization to gain and maintain an advantage. Organizations that tend to be successful in these factors also tend to be successful in their endeavors. Each type of organization has its own CSFs, which change with the purpose of the organization, and, in the military, the mission.

Four basic sources generate the CSFs: Industry characteristics, competitive position, general environment, and organizational developments:

- The industry's characteristics define the make up of the industry in which the organization is competing. There is no set order of CSFs as they vary with the organization assessed.

- Competitive positions vary according to the organization's position among its

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[84] Mitzberg, Henry, *The Rise and Fall of Strategic Planning; Preconceived Roles for Planning, Plans, Planners*, (New York, The Free Press, 1994), 25
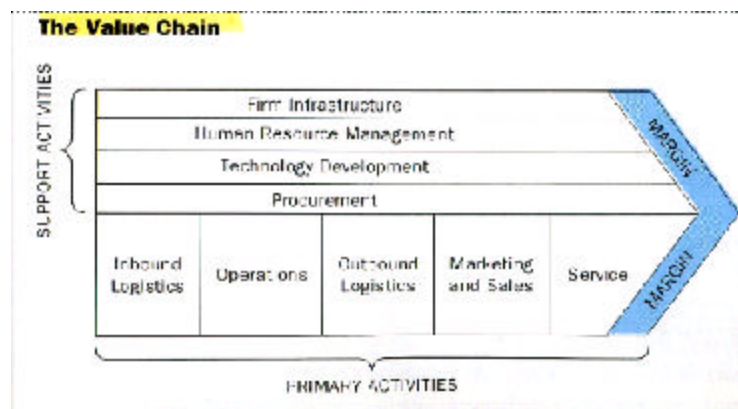
competitors. Simply stated, this is an assessment of the organization as it stands among its peers.

- The general environment will change with a variation in the general environment mentioned earlier. Usually a change here will constitute a change in a CSF.

- Organizational developments will generally also generate a new set order of CSFs.

When developing the COA the planner should address possible, temporary, CSFs when internal reorganizations take place.[85]

The Value Chain (Figure 5) divides the organization into a number of linked activities that allows the assessment of the value of the organization as it relates to the customer or user.[86] In terms of assessing value, the Value Chain assesses those factors that differentiate the service or product, those that make it more efficient, and those factors that allow it to respond to the customers desires more quickly.

The Value Chain categorizes the organizations functions into primary and support activities.

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[85] Alex Miller and Gregory G Dess. *Strategic Management,* Second Edition (New York, The McGraw-Hill Companies, Inc. 1996), 108-110
[86] Alex Miller and Gregory G Dess. *Strategic Management,* Second Edition (New York, The McGraw-Hill Companies, Inc. 1996), 110

Figure 5

Planners use the core processes and systems assessment tool to assess the value or effectiveness of organizations. This model assesses the entire process or system rather than the individual activities, as those found in the Value Chain.[87] It allows the planner to assess the efficiency of all the factors as they come together to provide a service or product. The core processes consist of both a primary process and its support systems.

The primary process includes product development, demand management, and order fulfillment.

- Product development includes an assessment of the service or product offered by the organization and the possibility of new products. For the operational planner this translates into the capability of the organization to accomplish a specific task and the efficiency with which it does so.

- Demand management defines the customers needs for the service provided and assesses the potential for new and additional needs.

- Order fulfillment assesses the organization's ability to fulfill the demands or requirements placed on the organization. The support systems analyze the organization's ability to mange resources required for the primary processes to work effectively. These resources include capital, information, human resources and control systems.[88]

- Capital resourcing includes all those steps required to obtain and distribute capital throughout an organization.[89] This includes an assessment of the most effective methods of providing and allocating resources.

- Human resourcing is the system that provides people to the organization. The

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[87] Ibid. 113
[88] Ibid. 115-116
[89] Ibid. 115

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quality, and certainly the quantity, of people affect the capability of the organization to perform. This system includes recruiting, selecting, training, educating, evaluating, rewarding and promoting personnel.[90]

- Information resourcing assesses the organization's capability to move required information across and through the organization. The handling of classified information and computer information systems are examples of how the Army resources information.

- Control systems measure the organizations ability to control its own interests, by allocating resources through the primary processes.

When Army planners assess the internal factors of an Army organization, the assessment characteristics might include the elements of combat power-leadership, protection, firepower, maneuver and information.[91] When determining the proper characteristic used, the planner should assess the organization based on the desired end state.

The Value Chain provides the planner an excellent tool for categorizing information about the organization. Its design permits an assessment of all aspects of indicators of efficient operations.

Planners should analyze the external environment considering the facts and assumptions derived from a thorough analysis of both the external and competitive environments. When possible, the planner focuses on the smallest organizational element. Focusing on the smallest element facilitates clarity of purpose.

Information organized into scenarios allows the planners to test possible COAs. The effective planner's ability to develop an abstract understanding of the information available allows thinking through analogies and permits a breakaway from the typical or routine COA.[92]

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[90] Ibid. 115

[91] Headquarters, Department of the Army, *Field Manual 3-0, Operations.* (Washington, D.C: GPO, 14 June 2001), 4 - 4.
[92] Dietrich Dörner, *The Logic of Failure: Why Things Go Wrong and What We Can Do to make Them Right* (New York, New York, Metropolitan Books, 1989), 77

An important part of the planner's role is to identify strengths, weaknesses, opportunities, and threats and adjust the proposed COAs accordingly. In COA development, the planner should also consider the impact of environmental forces on the organization.

Paramount to efficient problem resolution is the planner's ability to understand the interrelation of SWOT as both facts and assumptions, as variables of the problem and how they contribute to efficient COA development.

Army planners will find the efficient categorization of information facilitates both the analysis and synthesis of information. This same organization will then permit the planner to develop COAs that are feasible, suitable, and acceptable to the decision makers.

Assessing the Progress

"Failure does not strike like a bolt from the blue; it develops gradually according to its own logic".[93] Well-meaning decisions routinely go wrong and do not achieve the desired end state. Paul Nutt, a decision-making theorist, claims that only one-half of business decisions actually achieve the goals originally established by the decision maker.[94] Obviously, the operational planner developing our nation's plans for exercising the military instrument of power, cannot afford this level of success he must do much better.

Accepting that some COAs will not result in the desired end state requires the planner to establish a plan in itself, to measure the progress of the decisions implementation. This concept is not new to decision making theories. In fact, the three primary processes discussed in the previous chapters included this step, but it is rarely executed because decision makers tend to decide and move on to the next problem. Army doctrine compares the progress of decision

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[93] Ibid. 10
[94] Paul C. Nutt, *Why Decisions Fail: Avoiding the Blunders and Traps that Lead to Debacles* (San Francisco, Berrett-Koehler Publishers, Inc., 2002), 3

implementation against the previously determined criteria for success and the desired end state.[95]

These factors are suitable after reaching the prescribed COA, but do not do much for the planner

in anticipating failure. Another tool that will assist the planner is a critical set of factors designed

to measure the progress or effectiveness of the decision's implementation; in other words,

"planning here is focused instead on seeing that the intended strategy is implemented."[96] These

factors ultimately serve as early warning signs to the decision maker and planner that something

is not right.

These factors should consist of both holistic and analytical assessment tools to provide a

complete picture of the progress of the decision's implementation. Planners should keep in mind

that within an organization, many variables are interrelated and an action upon one will likely

result in an action on another. This could work to the benefit of the planner if the associated

variables that are positively affected make up the components to two or more COAs.

The figure below (Figure 6) attempts to illustrate the critical set of factors imposed on a

pair of associated variables. The parallel lines represent the associated controllable variables and

the dots on the lines indicate points in which the planner applies the factors to measure progress.
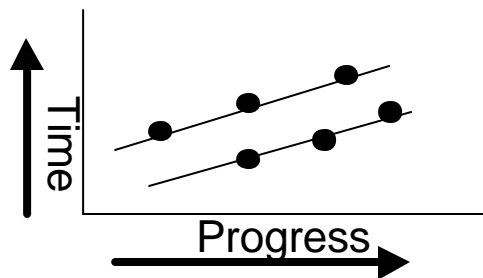

Figure 6

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[95] HQ Department of the Army, FM 5-0, *Army Planning and Orders Production* (Final Draft), (Washington, D.C.: GPO, 15 July 2002), 2-10

[96] Alex Miller and Gregory G. Dess, Strategic Management, 2d Edition (New York, McGraw-Hill Companies, Inc., 1996), 345

Keeping in mind the leadership axiom "what is checked gets done," the planner should take careful consideration to defining the factors of assessment. Checking or measuring the wrong factor can easily lead to a false sense of success or conversely a change in the plan when a change is not necessary or desired.[97] These factors should be relevant to the desired end state as well as tied or be applicable directly to the controllable variable. [98] For military planners, the decisive points found along a line of operation would suffice as a suitable assessment factor.

The business community offers other measurements that might also be helpful to the operational planner.

- The organizations financial perspective addresses these factors of assessment which provide a measure of a return on investment. The return on investment measure is holistic, as it includes all aspects of the organization in generating wealth. A drawback is that financially oriented measures are historically oriented, and do not allow for a changing environment.[99]

- A second measure, taken from the customer's perspective, the organization focuses upon the level of satisfaction among an organization's customers, as well as the standing of the customers among their fields. This measure is effective when the problem addressed contains a stakeholder variable.

- The operations perspective measures the delivery efficiency in getting the product to the customer. This is a time-based and analytical measure of performance.

- The organizational perspective is another holistic measurement tool.[100] It

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[97] Ibid. 460

[98] This factor should be one expected to take place in the resolution of the problem. Expectancies in this case refer to one of the four by-products of recognition. For more information on expectancies or by-products of recognition see Klein's, *Sources of Power*, 1999

[99] Alex Miller and Gregory G. Dess, Strategic Management, 2d Edition (New York, McGraw-Hill Companies, Inc., 1996), 463

[100] Ibid. 463

measures organization's strengths and weaknesses. This is also a historically

oriented measure.

If a factor does not achieve or does not meet the level of criteria established, then the

COA is not on track to achieve the goals or end state established by the decision maker. If this is

the case, then a change to the plan (a branch plan) or an adjustment of the end state to better suit

the demands of the decision maker.

Goal setting is the first step in the complex problem solving process. While not

imperative from the beginning, correctly identifying a specific goal or end state from the

beginning facilitates accurate and timely decision-making. The specific goal serves to orient the

planner towards gathering relevant information from which to develop the courses of action of

which the decision maker chooses. Finally, the planner's assessment factors allow the rapid

recognition of poor decision-making or incorrect implementation. These factors are necessary to

efficiently redirect a course of action that does not support the desired end state.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The Army's existing problem solving and decision making doctrine does not provide the

necessary combination of art and science in order to permit the operational planner a sufficient

tool for planning at the operational level. The Army's doctrine correctly identifies three types of

problems. Yet other than identifying the characteristics of each type of problem, it does not go

into the details of how a planner could attack each.

Operating on the edge of chaos, operational planners require a great amount of

knowledge and experience to maintain this perfect balance. Further, highlighting this challenge,

they rarely receive sufficient initial beginning guidance and are frequently given problems with little forewarning or understanding of the problem environment.[101]

When approached correctly, operating on the edge of chaos may in fact represent an opportunity for the planner and decision maker. Their combined values, skills, and experiences determine their ability to understand the nature of the environment and establish complex systems to bring about order.[102] Truly effective and creative planners and decision makers must be willing to take risk and think outside of the norm, to make bold, but carefully considered assumptions, apply inductive reasoning skills, and employ new problem techniques. This risk taking will eventually lead to an improved product. Because of this complexity, planners must understand the second and third order of effects of the problem and the chosen solution.[103]

The decision maker leads the creative planning process. He does this by providing a shared vision for the planner and by outlining the problem environment, without imposing limits. This shared vision is necessary in order for the planner to continue to learn, and it provides the focus and desire to grow and evolve.[104] The decision maker can expect the evolutionary learning process to guide the planner through the chaotic planning environment.[105]

The concept of opportunity in planning in an environment with little guidance or direction comes from the lack of limits placed on the team. Conversely, planning in a highly limiting environment and little or poor guidance will place constraints on the planner. Calling on experience, and through extrapolating abstract guidance provided by the decision maker, the

[101] LTC (P) Alan M. Mosher, USA, LTC (P) Brian F. Waters, USA, and LTC (P) Robert C. Johnson, USA, *Assumption Based Campaign Planning* (Advanced Military Studies Program Monograph, Command And General Staff College, 2002) Abstract
[102] M. Mitchell Waldrop, *Complexity: The Emerging Science at the Edge of Order and Chaos* (New York, New York: Touchstone, 1992), 11.
[103] LTC (P) Jeffrey Jarkowsky, interviewed by author, telephone, 1 April 2003
[104] Senge, Peter M., *The Fifth Discipline; The Art & Practice of The Learning Organization* (New York, New York: Doubleday, 1994), 206
[105] Ibid. 295

planner, with confidence, calls on intuition to make assumptions and uses inductive reasoning order to shape and define the incomprehensible problem.[106]

The science of problem solving evolves around many processes. While generally following a methodical, systematic sequence, some variances can prove significant to the result. The process selected should be relevant and executable given the constraints of the problem environment and planners should guard against becoming process oriented. As Clausewitz warns, the danger of Methodism is that "it can impose a crippling conservatism"[107] on the planner's problem solving abilities. Planners must learn to adapt their systems, and not wait passively for events to unfold around them in an effort to gain a clearer picture. Operational planners should focus on the goals of the plan, not necessarily the process.[108]

Goal definition is the first element in dealing with complex problems.[109] Operational planners, while understanding the strategic goals, should also understand the linkage of the tactical action to the strategic goals.[110] In formulating goals, planners must understand the complexity of the system in which they are attempting to solve the problem. The planner must be willing to examine and reassert the goal regularly, in order to determine and assure continued relevancy. A rigid, uncompromising goal, defined too early and not adjusted will not result in successful problem resolution. The defined goal serves as the basis for the planner's and decision maker's shared vision, and if not adjusted when necessary, will lead the team away from the true problem. An indication that the team is on the correct path to goal setting is that when an unclear

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[106] M. Mitchell Waldrop, *Complexity: The Emerging Science at the Edge of Order and Chaos* (New York, New York: Touchstone, 1992), 253

[107] Dietrich Dörner*, The Logic of Failure: Why Things Go Wrong and What We Can Do to Make Them Right* (New York, New York, Metropolitan Books, 1989), 45

[108] LTC (P) Jeffrey Jarkowsky, interviewed by author, telephone, 1 April 2003

[109] Dietrich Dörner*, The Logic of Failure: Why Things Go Wrong and What We Can Do to Make Them Right* (New York, New York, Metropolitan Books, 1989), 43

[110] LTC (P) Jeffrey Jarkowsky, interviewed by author, telephone, 1 April 2003

goal is made clear the team will likely discover a multifaceted problem, or a problem that consists of many partial problems.[111] The planner that cannot formulate adequately his goal and understand the interactions between the variables will suffer the same fate of many peers-creating many additional problems and working much harder.

After determining the goal, the planner begins to gather and categorize information. The Army's doctrine falls short in framing for the operational staff officer and leader the necessary data collected in order to facilitate an understanding or translation into information. Information gathering is more than plugging holes with facts and assumptions. The planner categorizes the information for relevancy, as facts or assumptions. Critical in the decision-making process, the planner must present the information necessary in a logical fashion in order to facilitate understanding by the decision maker.

The decision maker establishes factors for assessing the execution and results of the decision. These factors are found in a variety of sources, but the common denominator each possesses is relevancy to the problem environment. As the decision maker identifies a variation from the anticipated plan of action, the planner develops branch plans to ensure that the goal or end state is still achievable.

Recommendations

The Army should expand upon its existing problem solving and decision-making doctrine. The current doctrine does not adequately support the problem environment that exists in the Army. The Army's doctrine should include the RPD and the complex problem solving process models.

The Army's seven-step process assumes a higher headquarters provides the problem solver with a desired end-state, time constraints, and resources from which to define the problem.

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[111] Dietrich Dörner, *The Logic of Failure: Why Things Go Wrong and What We Can Do to Make Them Right* (New York, New York, Metropolitan Books, 1989), 55

This assumption is routinely found invalid in the Army's problem environment and the Army's current model is found wanting of a more helpful process.
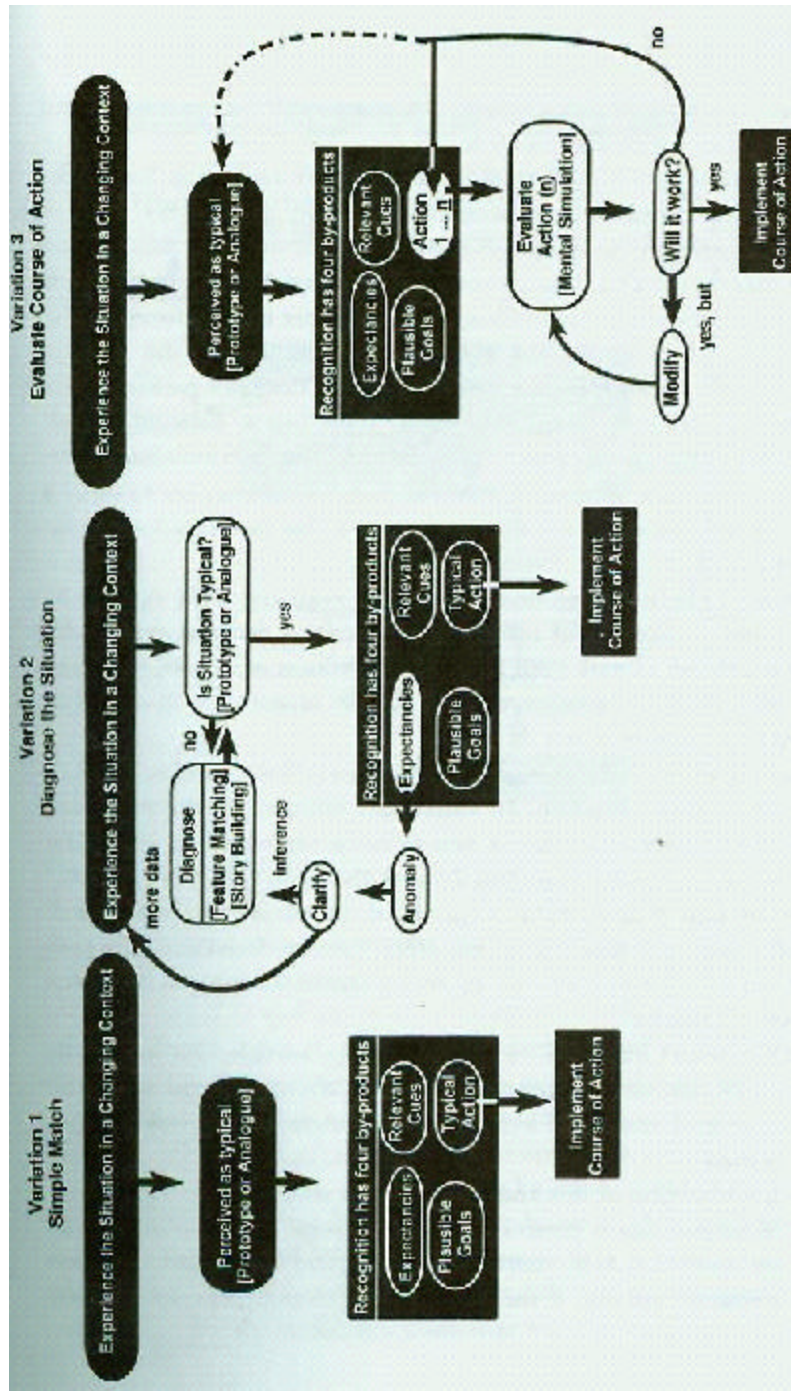
The Army's doctrine should summarize a relevant problem solving theory. The omission of theory leaves too much speculation up to the user, and frequently this leads to an undesirable result - failure. Problem theory permits the planner and decision-maker to develop a better appreciation for the various processes available; this, in turn, will allow them to make batter decisions in determining which process to use.

The Army doctrine should define the parameters of an end-state. Formulating the end state into something that assists in creating a common understanding of the objectives is arguably the most important component for problem-solving success. Decision makers and planners have a need to be familiar with the components of defining a goal.

The Army's doctrine should provide tools for categorizing information collected. Given the complexities of the problem environment, the planners require a tool to present the information collected. This tool should encompass all relevant information, and allow distinguishable categories for sorting the information deemed relevant by the planner. The SWOT model used by business decision makers is suitable, with some slight modifications of the wording found in the SWOT's analysis tools.

The Army's doctrine should expand on assessing the progress of implementation, by defining critical success criteria and providing supportable examples. Determining a set of the critical success criteria through which to assess the progress of implementation presents a challenging issue to the planner.

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APPENDIX

Variation 1
Simple Match

Experience the Situation in a Changing Context

Perceived as typical [Prototype or Analogue]

Recognition has four by-products: Relevant Cues, Typical Action, Expectancies, Plausible Goals

Implement Course of Action

Variation 2
Diagnose the Situation

Experience the Situation in a Changing Context

Is Situation Typical? [Prototype or Analogue]

Diagnose [Feature Matching] [Story Building]

more data

no

Inference

Clarify

Anomaly

yes

Recognition has four by-products: Relevant Cues, Typical Action, Expectancies, Plausible Goals

Implement Course of Action

Variation 3
Evaluate Course of Action

Experience the Situation in a Changing Context

Perceived as typical [Prototype or Analogue]

Recognition has four by-products: Relevant Cues, Action 1...n, Expectancies, Plausible Goals

Evaluate Action (n) [Mental Simulation]

Will it work?

Modify

no

yes, but

yes

Implement Course of Action

51

BIBLIOGRAPHY

Books

Turabian, Kate L., *A Manual for Writers of Term Papers, Theses, and Dissertations,
Sixth Edition,* Chicago and London, The University of Chicago Press, 1996

Alex Miller and Gregory G Dess. *Strategic Management,* Second Edition, New York,
The McGraw-Hill Companies, Inc. 1996

Mitzberg, Henry, *The Rise and Fall of Strategic Planning; Preconceived Roles for Planning,
Plans, and Planners*, New York, The Free Press, 1994

Senge, Peter M., *The Fifth Discipline; The Art & Practice of The Learning Organization,*
New York, New York: Doubleday, 1994

M. Mitchell Waldrop, *Complexity: The Emerging Science at the Edge of Order and Chaos,*
New York, New York: Touchstone, 1992

Dietrich Dörner, *The Logic of Failure: Why Things Go Wrong and What We Can Do to Make
Them Right,* New York, New York, Metropolitan Books, 1989

Ackoff, Russell L., *The Art of Problem Solving,* New York, Chichester, Brisbane, Toronto,
John Wiley & Sons, Inc., 1978

Nutt, Paul C., *Why Decisions Fail: Avoiding the Blunders and Traps that Lead to Debacles,*
San Francisco, Berrett-Koeler Publishers, Inc., 2002

George C. Sawyer, *Corporate Planning As A Creative Process,* Oxford, Ohio,
Planning Executives Institute, 1983

US Government Manuals and Reports

Headquarters, Department of the Army*, Field Manual 3-0, Operations,* Washington, D.C.:
GPO, 14 June 2001

Headquarters, Department of the Army, *Field Manual 5-0, Army Planning and Orders
Production (Final Draft)*, Washington, D.C.:GPO, 15 July 2002

Headquarters, Department of the Army, *FM 6-0, Command and Control (DRAG),* Washington,
D.C.: GPO. March 2001

Mosher, LTC (P) Alan M. USA, Waters, LTC (P) Brian F. USA, and Johnson, LTC (P) Robert C. USA,
Assumption Based Campaign Planning, Advanced Military Studies Program Monograph,
Command And General Staff College, 2002

Interviews

LTC Thomas J Jardine, Former I Corps planner and currently a Pentagon planner, Interview with author, 31 March 2003

LTC (P) Jeffrey Jarkowsky, Former 75th Ranger Regt planner, Infantry Battalion Commander and currently a Joint Forces Command planner, interview with author, 1 April 2003.